CLAIMS:

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A method for supporting multifield classification of a packet fragmented into a plurality of fragments in a wire-speed forwarding platform, the method comprising:

(a) receiving a fragment of the fragmented packet at the forwarding platform and deriving a key from one or more fields of the received fragment; and

(b) performing multifield classification of the received fragment by matching the key to a rule out of a plurality of rules, the rule comprising a plurality of fields including at least one field for specifying whether the received fragment's fragmentation characteristics are to be applied when performing the multifield classification.

2. The method for supporting multifield classification according to Claim 1, wherein the rule further comprises a field for specifying an action to be applied to the received fragment, the method further comprising a step of:

applying the action to the received fragment when the key matches the rule for the received fragment.

3. The method for supporting multifield classification according to Claim 1, further comprising the steps of:

receiving a packet at the forwarding platform; and

testing the received packet for determining whether the packet represents a fragment; and

performing the multifield classification of the received packet by matching a key derived from one or more fields of the received packet to a rule, the rule comprising a plurality of fields including at least one field for specifying

whether the received packet's fragmentation characteristics are to be applied when performing the multifield classification.

4. The method for supporting multifield classification according to Claim 1, further comprising the steps of:

determining whether there are any transfer control protocol (TCP) rules; and

performing the multifield classification if no TCP rules are indicated.

5. The method for supporting multifield classification according to Claim 1, further comprising a step of preprocessing the received fragment by querying a data structure in the forwarding platform, the data structure comprising one or more flags for determining whether the received fragment is to be classified in the forwarding platform.

6. The method for supporting multifield classification according to Claim 5, wherein the preprocessing determines to forward the received fragment to a slow-speed forwarding platform.

7. The method for supporting multifield classification according to Claim 5, wherein the preprocessing determines to discard the received fragment.

8. The method for supporting multifield classification according to Claim 5, wherein the one or more flags are exclusive of one another.

9. The method for supporting multifield classification according to Claim 1, wherein the one or more fields that comprise the key derived from the received fragment include fields from headers representing one or more transmission protocols.

10. The method for supporting multifield classification according to Claim 9, wherein the one or more transmission protocols include: Internet Protocol (IP); User Datagram Protocol (UDP); Internet Control Message Protocol (ICMP); and Internet Group Management Protocol (IGMP).

11. The method for supporting multifield classification according to Claim 9, wherein the one or more fields include: source address (SA), destination address (DA), protocol, fragmented flag (FRAG) and not subsequent flag (NO SUBS) from a header of an IP transmission protocol; and a source port (SP) and a destination port (DP) from a header of a TCP transmission protocol.

12. The method for supporting multifield classification according to Claim 1, wherein a field in each rule comprises one or more values to be matched against the one or more fields of the derived key for the received fragment.

13. The method for supporting multifield classification according to Claim 12, wherein the one or more values represent an upper and a lower limit for a field in each rule.

14. The method for supporting multifield classification according to Claim 1, wherein the one or more values represent a mask and a value.

15. The method for supporting multifield classification according to Claim 1, wherein the plurality of rules are stored in the forwarding platform.

16. The method for supporting multifield classification according to Claim 1, wherein the plurality of rules are stored in a rules database.

17. A wire-speed forwarding platform for supporting multifield classification of a packet fragmented into a plurality of fragments, the platform comprising:

(a) media interface for receiving a fragment of the fragmented packet at the forwarding platform;

(b) a network processor for deriving a key from one or more fields of the received fragment; and performing multifield classification of the received fragment by matching the key to a rule out of a plurality of rules, the rule comprising a plurality of fields including at least one field for specifying whether the received fragment's fragmentation characteristics are to be applied when performing the multifield classification.

18. The wire-speed forwarding platform according to Claim 17, wherein the rule further comprises a field for specifying an action to be applied to the received fragment, the network processor further applying the action to the received fragment when the key matches the rule for the received fragment.

19. The wire-speed forwarding platform according to Claim 17, wherein the media interface further receives a packet at the forwarding platform, and the network processor testes the received packet for determining whether the packet represents a fragment and performs the multifield classification of the received packet by matching a key derived from one or more fields of the received packet to a rule, the rule comprising a plurality of fields including at least one field for specifying whether the received packet's fragmentation characteristics are to be applied when performing the multifield classification.

20. The wire-speed forwarding platform according to Claim 17, wherein the network processor further determines whether there are any transfer control protocol (TCP) rules and performs the multifield classification if no TCP rules are indicated.

21. The wire-speed forwarding platform according to Claim 17, wherein the network processor further preprocesses the received fragment by querying a data

structure in the forwarding platform, the data structure comprising one or more flags for determining whether the received fragment is to be classified in the forwarding platform.

22. The wire-speed forwarding platform according to Claim 21, wherein the preprocessing by the network processor determines to forward the received fragment to a slow-speed forwarding platform.

23. The wire-speed forwarding platform according to Claim 21, wherein the preprocessing by the network processor determines to discard the received fragment.

24. The wire-speed forwarding platform according to Claim 21, wherein the one or more flags are exclusive of one another.

25. The wire-speed forwarding platform according to Claim 1, wherein the one or more fields that comprise the key derived from the received fragment include fields from headers representing one or more transmission protocols.

26. The wire-speed forwarding platform according to Claim 25, wherein the one or more transmission protocols include: Internet Protocol (IP); User Datagram Protocol (UDP); Internet Control Message Protocol (ICMP); and Internet Group Management Protocol (IGMP).

27. The wire-speed forwarding platform according to Claim 25, wherein the one or more fields include: source address (SA), destination address (DA), protocol, fragmented flag (FRAG) and not subsequent flag (NO SUBS) from a header of an IP transmission protocol; and a source port (SP) and a destination port (DP) from a header of a TCP transmission protocol.

28. The wire-speed forwarding platform according to Claim 17, wherein a field in each rule comprises one or more values to be matched against the one or more fields of the derived key for the received fragment.

29. The wire-speed forwarding platform according to Claim 28, wherein the one or more values represent an upper and a lower limit for a field in each rule.

30. The wire-speed forwarding platform according to Claim 17, wherein the one or more values represent a mask and a value.

31. The wire-speed forwarding platform according to Claim 17, wherein the plurality of rules are stored in the forwarding platform.

32. The wire-speed forwarding platform according to Claim 17, wherein the forwarding platform further comprises control memory associated with the network processor for storing a rules database comprising the plurality of rules.

33. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method steps for supporting multifield classification of a packet fragmented into a plurality of fragments in a wire-speed forwarding platform, the method comprising:

(a) receiving a fragment of the fragmented packet at the forwarding platform and deriving a key from one or more fields of the received fragment; and

(b) performing multifield classification of the received fragment by matching the key to a rule out of a plurality of rules, the rule comprising a plurality of fields including at least one field for specifying whether the received fragment's fragmentation characteristics are to be applied when performing the multifield classification.

34. The method for supporting multifield classification according to Claim 33, wherein the rule further comprises a field for specifying an action to be applied to the received fragment, the method further comprising a step of:

applying the action to the received fragment when the key matches the rule for the received fragment.

35. The method for supporting multifield classification according to Claim 33, further comprising the steps of:

receiving a packet at the forwarding platform; and

testing the received packet for determining whether the packet represents a fragment; and

performing the multifield classification of the received packet by matching a key derived from one or more fields of the received packet to a rule, the rule comprising a plurality of fields including at least one field for specifying whether the received packet's fragmentation characteristics are to be applied when performing the multifield classification.

36. The method for supporting multifield classification according to Claim 33, further comprising the steps of:

determining whether there are any transfer control protocol (TCP) rules; and

performing the multifield classification if no TCP rules are indicated.

37. The method for supporting multifield classification according to Claim 33, further comprising a step of preprocessing the received fragment by querying a data structure in the forwarding platform, the data structure comprising one or more flags for determining whether the received fragment is to be classified in the forwarding platform.

38. The method for supporting multifield classification according to Claim 37, wherein the preprocessing determines to forward the received fragment to a slow-speed forwarding platform.

39. The method for supporting multifield classification according to Claim 37, wherein the preprocessing determines to discard the received fragment.

40. The method for supporting multifield classification according to Claim 37, wherein the one or more flags are exclusive of one another.

41. The method for supporting multifield classification according to Claim 33, wherein the one or more fields that comprise the key derived from the received fragment include fields from headers representing one or more transmission protocols.

42. The method for supporting multifield classification according to Claim 41, wherein the one or more transmission protocols include: Internet Protocol (IP); User Datagram Protocol (UDP); Internet Control Message Protocol (ICMP); and Internet Group Management Protocol (IGMP).

43. The method for supporting multifield classification according to Claim 41, wherein the one or more fields include: source address (SA), destination address (DA), protocol, fragmented flag (FRAG) and not subsequent flag (NO SUBS) from a header of an IP transmission protocol; and a source port (SP) and a destination port (DP) from a header of a TCP transmission protocol.

44. The method for supporting multifield classification according to Claim 33, wherein a field in each rule comprises one or more values to be matched against the one or more fields of the derived key for the received fragment.

45. The method for supporting multifield classification according to Claim 44, wherein the one or more values represent an upper and a lower limit for a field in each rule.

46. The method for supporting multifield classification according to Claim 33, wherein the one or more values represent a mask and a value.

47. The method for supporting multifield classification according to Claim 33, wherein the plurality of rules are stored in the forwarding platform.

48. The method for supporting multifield classification according to Claim 33, wherein the plurality of rules are stored in a rules database.

49. A method for supporting multifield classification of a packet fragmented into a plurality of fragments in a wire-speed forwarding platform, the method comprising:

(a) receiving a fragment of the fragmented packet at the forwarding platform and deriving a key from one or more fields of the received fragment;

(b) preprocessing the received fragment by querying a data structure that comprises one or more flags for determining whether the received fragment is to be classified in the forwarding platform;

(c) redirecting or discarding the received fragment from the forwarding platform if it is determined that the received fragment is not to be classified at the forwarding platform; and

(d) performing multifield classification of the received fragment by matching the key to a rule out of a plurality of rules, the rule comprising a plurality of fields including at least one field for specifying whether the received fragment's fragmentation characteristics are to be applied when performing the multifield classification.

50. A method for supporting multifield classification of a packet fragmented into a plurality of fragments in a wire-speed forwarding platform, the method comprising:

(a) receiving a fragment of the fragmented packet at the forwarding platform and deriving a key from one or more fields of the received fragment;

(b) determining whether there are transfer control protocol (TCP) rules and if it is determined that there are no TCP rules indicated performing multifield classification of the received fragment according to step (d);

(c) preprocessing the received fragment if there are TCP rules by querying a data structure that comprises one or more flags for determining whether the received fragment is to be classified in the forwarding platform and redirecting or discarding the received fragment from the forwarding platform if it is determined that the received fragment is not to be classified at the forwarding platform; and

(d) performing multifield classification of the received fragment by matching the key to a rule out of a plurality of rules, the rule comprising a plurality of fields including at least one field for specifying whether the received fragment's fragmentation characteristics are to be applied when performing the multifield classification.